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THE GREAT HALL OF PADUA.

[The Palace of Justice, Herb-market, &c., Padua.]

ONE of the chief curiosities of Padua is the hall or saloon contained in the Palace of Justice (the building seen on the right of the above engraving), and which, for size, has no rival in any part of Europe. What are its exact dimensions we cannot say, for the accounts furnished by different writers vary; but we shall not be far from the truth in stating that the hall is about three hundred feet long, one hundred feet broad, and one hundred feet high. The palace stands on one side of the open space called sometimes Place Salone, from the hall; sometimes Piazza del' Erbe, from the herb-market which is held here. The building was commenced in 1132 (on the site anciently occupied by the Senate House), by driving a great number of large piles into the ground, the interstices of which were filled up with masonry. The foundation being thus formed, the work was allowed to remain in that state until 1209, in order, according to some writers, that it might settle, and become thoroughly firm and compact, a statement that seems to prove that the people of Padua cared very little about the completion of their great hall, or that their patience was most exemplary. Whatever the cause of the delay, the edifice was again proceeded with in the year last mentioned, and completed in 1219. Whether a flat roof then existed, which, not being liked, was afterwards removed; or whether the architect failed to cover the immense space with a safe and durable erection, having only the walls for its support, we do not find anywhere mentioned; but some such cause, we presume, must have led to the building of a second and arched roof in 1306, which was done from the designs of Father John, a monk of no mean architectural acquirements, as the success of the new work proved. After this the walls and ceiling were adorned with a profusion of fresco paintings by Giotto and his scholars, which, in the last century, were retouched by Zannoni. The excellence of the masonry of the building has been put to some severe tests, by the shocks of earthquakes, for instance, which have been felt at Padua, and all of which it has borne without the slightest damage.

The effect produced by a first sight of the interior is very impressive; its vastness at once fixes and absorbs the mind: and there is nothing to break or even to lessen this effect; no galleries, pillars, or erections of any magnitude projecting from the walls; from one end to the other, the eye roams over an uninterrupted space. The hall contains several objects of interest. Against the wall at one end, near the Gothic chair in which sits the president of the court during the administration of justice, is a monument with an ancient bust, to the memory of the great historian Livy, who was born and died in Padua. An inscription on the base concludes with a sentiment expressive of the veneration of the Paduans for their illustrious countryman; it is to the effect that had their means been adequate to their zeal, the marble statue should have been a golden one. Of the fresco paintings, those on the ceiling are entirely lost, owing, says Mrs. Starke, in her work for travellers on the Continent, to the roof having been blown off. The date or cause of this misfortune she does not mention. We may judge how numerous these works of art must have been in the whole, by counting the number contained in the uppermost row, which amounts to three hundred and nineteen. There are in the hall various other monuments to eminent natives of the city, including one to Belzoni. Two Egyptian statues of granite, presented by the traveller to his countrymen, are also placed here. Lastly, the hall con

tains the stone—the "Lapis Vituperii" noticed by Addison, in 1700, at the Hôtel de Ville, and which has since been transferred to its present situation. On this stone debtors were obliged to sit three different times, in the full view of the public, half naked, and swear that they were not worth a certain trifling (specified) sum. After the conclusion of the ceremonies, the debtor was entirely freed from his debts. During the middle ages, most of the principal towns of Italy possessed stones of this kind. At Sienna the form of speech prescribed by the law to be uttered by the chief actor in the ceremony, whilst seated upon the stone, was as follows:—"I have consumed or dissipated all I had; I pay my creditors in the manner that you see."

The hall has been used as a bazaar, as well as for its more legitimate purpose—the transaction of public business, and more particularly for that part of it which concerns the administration of justice. But for some years prior to 1836, it had become so dilapidated from want of timely reparation, as to be quite useless. It was then about to undergo a complete repair, and be again applied to the objects for which it was built.

DOMESTIC CHEMISTRY.—No. XII.

A QUARTERN LOAF.

Nutritious grains, from which bread may be made, bear a considerable resemblance one to another, and all are occasionally selected for this purpose; but wheat possesses the most valuable properties. It is for this reason that the term wheaten is applied to the better kinds of bread, and commands for them a higher price. As the production of a loaf of bread is, in some respects, the most useful of the useful arts, we will briefly describe the processes as usually conducted.

The methods by which the farmer cultivates his cornfield, gathers in the harvest when ripe, and separates the grain from the stalk, we may pass over, as having been recently treated in our Agricultural Supplements. We will suppose the grains of wheat about to be converted into flour.

When wheat is brought to the miller, it is generally too moist for grinding, as, instead of becoming a powder, it would simply be crushed, and would thus clog the millstones. The wheat is therefore spread over a floor constructed of tiles full of small holes. A fire is kindled below the tiles, and the heated air ascending through the holes is admitted to the wheat, which is spread in a layer three or four inches deep. The wheat is subjected to the action of this heated air for about three hours and a half, during which time it is frequently turned over and stirred up. The action of the heat removes the moisture from the grains; and when steam ceases to issue from them, they are removed to a loft, where they are left to cool, and to acquire a certain degree of mellowness, without which the resulting flour would be of inferior quality.

The wheat is now to be cleansed. This is effected by means of a wire cylinder called a *separator*, the wires of which are bent into the form of hoops, and are placed so close that when the grain is introduced and the separator whirled round, none but the small ill-conditioned grains and particles of dirt and sand fall through. The small grain is sold to the distiller, for the purpose of making spirit; and the larger grain which remains in the cylinder is reserved for the making of bread.

The grain is next placed in another screen, consisting of a cylinder of sheet-iron punched full of holes from the outside, whereby a sharp burr points inwards from each hole. The corn is agitated in this cylinder for the purpose of removing the rough end of the grain, which is a brownish soft kind of hair. The grain is next put into an oblong box having a wire-gauze bottom. This box is shaken rapidly to and fro; and at the same time certain fans or vanes, which revolve round an axis placed across the box, excite a current of air through the grain, which blows off the adherent dust and bran.

The grain is now carried to the mill, which, properly speaking, consists of two large stones placed one on another, and moving in contrary directions round a central axis. The corn is made to pass through a hopper or funnel into a hollow space between the stones, occasioned by the contiguous surfaces of the stones being concave. The stones being set in motion, the corn becomes broken up into powder, and is whirled out from between them in the form of meal. As this meal is a mixture of flour and bran, the latter consisting of the husks of the grain, it is necessary to separate them; and for this purpose the meal is placed in a wire cylinder, down the middle of which, and occupying its whole length, is a brush, consisting of a rod from which branch out hairs which touch the wires of the cylinder. The brush being made to rotate, all the flour of the meal is forced through the interstices of the cylinder; the bran, as well as portions of grain not reduced to flour, being retained. The contents of the cylinder are again ground between the mill-stones, by which an inferior kind of flour is produced: this is again passed through the cylinder, and the residue again ground, by which a still inferior flour is afforded.

By these processes are obtained three kinds of flour, technically called *firsts*, *seconds*, and *thirds;* and bread varies in its quality according as it is made of one or other of these kinds. French and cottage bread, best and seconds wheaten bread, and brown bread, differ chiefly in the quality of the wheat flour employed in them. Wheaten flour, in its purest state, consists principally of two proximate substances, *starch* or *farina* and *gluten*, the former occupying about two-thirds the weight of the whole. The nature of starch has already occupied our attention; and the existence of gluten in flour may be shown in the following manner. If a little flour be formed into a stiff paste with water, and worked in the hand under cold water frequently renewed, there results a tasteless, tough, elastic, grey substance, capable of stretching and collapsing like India-rubber. This substance is principally *gluten*, and is the ingredient in flour which confers on paste its adhesive quality; it is also the most nutritive portion of flour.

Before we trace the formation of flour into bread, we must briefly notice the difference between *fermented* and *unfermented* bread. The former is that which, previous to the operation of baking, undergoes a process of partial fermentation, by which the properties of the flour are somewhat altered, and the bread is made light and porous. The latter, of which *biscuit* is a familiar example, is made of dough which has not undergone the process of fermentation. If a mass of flour and water be let to stand for some time, a commotion takes place in it—carbonic acid is formed, and tries to escape, and in the act of so doing gives a honeycomb or porous texture to the substance: this process is fermentation. As, however, this fermentation goes on too slowly and too unequally for the purposes of the baker, it is hastened in one of two ways—by the application either of *leaven* or of *yest*. Leaven consists of a portion of a previous batch of dough which has been laid aside and allowed to partially ferment; and when mixed with new dough, it quickens and improves the fermentation. Leaven is also made artificially in two or three different modes. In some places, eight ounces of flour are mixed with a quart of warm water; and for two or three successive days, while the mass is fermenting, more flour and water are added, by which enough leaven is produced to ferment a large batch of dough. In some parts of Germany, wheat-bran and hops are boiled in water, and then left to ferment; when this occurs, more bran is thrown in, until the whole becomes a thick mass, which is then rolled up into balls, and preserved as leaven or ferment.

But English "quartern loaves" are most frequently

fermented with *yest*, a kind of froth which rises to the top of a liquor in the process of brewing, and which is productive of nearly the same effect as leaven.

The flour and yest then being the principal ingredients, the making of bread proceeds as follows:—A small quantity of yest is mixed with hot water, so that when dissolved it may have the temperature of blood-heat. The salt (of which about two pounds are generally used to a hundredweight of flour) is now added, and the liquor is thrown into a wooden trough. About one-third of the intended quantity of flour is added to the liquor, and is worked about with the hands, to free it from lumps. The surface of the mixture (which is now called *sponge*) is then pressed flat; a little dry flour is sprinkled over it, and the whole is covered up closely for several hours. During this time, fermentation goes on, and the mass of sponge greatly increases in bulk, in consequence of the formation of myriads of minute air-bubbles within it. The sponge is then mixed with a weak solution of salt, slightly warmed in cold weather. The rest of the flour is added, and the whole is worked up into a stiff uniform mass of dough. This kneading is effected in a very uncouth manner by the elbows and fists of the baker; and it is surprising that in an age when machinery is applied to so many purposes, this primitive mode of kneading dough should be still retained. In many parts of the Continent, and in some cases in England, machines have been employed for this purpose. In one of these machines, the dough is put into a square trough in which a cylinder revolves; and as the dough is carried round by the cylinder, it is pressed through a small aperture left between the cylinder and the trough, and becomes by that means perfectly mixed up into a homogeneous mass. In another machine, the dry flour is put into a hollow revolving cylinder, and water is introduced through perforations in the axis on which it revolves: the rotation of the cylinder then mixes the flour and water; and the mass, in each revolution, has to pass through a narrow aperture, and thus becomes kneaded.

When the dough is made, it is allowed to rest covered up for about an hour, during which time it swells, and, when sufficiently spongy, is said to be proof. It is then weighed into separate parcels, according to the intended size of the loaves; and these parcels, when sprinkled with flour, are ready for the oven.

A baker's oven is generally an arched vault floored with smooth fire-tiles, and is generally heated by means of a furnace placed at the side, the flue of which traverses the oven, and heats every part. The batch of bread is not put into the oven until the coals in the furnace burn with but little smoke. The old form of oven was arranged on the plan of kindling a fire *in* the oven itself, until it was intensely heated; the fuel was then withdrawn, and the floor cleared from the ashes and dust before the loaves were put in; but it was found that a great amount of heat escaped while the oven was being cleared and cleaned, and thus much fuel was wasted.

Two hours is the time generally allowed for the baking of bread in the usual ovens. The evaporation from the dough carries off about one-tenth of its whole weight during the process of baking, and a further portion of the weight is lost after the bread is removed from the oven. The different appearances which the sides of loaves present are owing to the positions in which they are placed in the oven, whether in contact with the heated tiles, exposed to the heated air, or in contact with one another.

In making loaves of an inferior quality, *potatoes* are very frequently used; and if the quantity be small, the bread is said to be improved thereby; but when added in large quantity for fraudulent purposes, which is sometimes the case, the bread is deteriorated. The existence of too large a quantity of potatoes in bread may often be indicated by the bread cracking and crumbling, by its soon turning sour, by adhering to the knife when cut, and by leaving a depression when pressed by the finger. The erroneous impression that *white* bread must necessarily be better than that of a darker tint, and therefore worth a higher price, frequently offers an inducement to the baker to add bleaching ingredients to his bread, in order to produce this effect; for no flour except the very finest will produce white bread. In this instance, the taste of the purchasers is partly to blame for the occasional admixture of bleaching substances in the bread. Alum, ground bones, or whiting, are among the ingredients occasionally employed for this purpose; and the means whereby the employment of them may be detected are these:—If bread contain whiting or chalk, and if diluted sulphuric acid be poured on it, there will be an effervescence; but there will be no deposit when pearlash is added to the filtered solution. If ground bones be contained in the bread, and diluted muriatic acid be poured on it, effervescence will ensue; and if it be then filtered and pearlash added, a white heavy deposit will be precipitated. If an excess of alum be used (a very small quantity improves the bread), pour boiling water on the bread; let it cool, and then press out the moisture; boil it away to one-third; when cold, filter it through blotting-paper, and add a little muriate of lime to the filtered liquor: if a muddiness now appear, an excess of alum may be suspected. For a similar end, persons sometimes use an excess of salt in their bread, as, by absorbing a great deal of water, it increases the weight of the loaves: when this is the case, the grain of the bread is very rough; and two loaves, on being parted, generally part uneven, one taking away a portion from the other. Generally speaking, however, we believe that London bread is tolerably free from adulteration.

French bread, cottage bread, French and English rolls, &c. are formed in a more porous and lighter manner than the larger loaves; and all, except the last mentioned, are made of the finest and whitest flour. Butter and milk are occasionally added to the other ingredients in fancy bread.

Changes in Literature.—At the renewal of letters in Europe, the taste was not to compose new books, but to comment on the old ones. It was not to be expected that new books should be written, when there were so many of the ancients, either not known or not understood. It was not reasonable to attempt new conquests, while they had such an extensive region lying waste for want of cultivation. At that period, criticism and erudition were the reigning studies of the times; and he who had only an inventive genius, might have languished in hopeless obscurity. When the writers of antiquity were sufficiently explained and known, the learned set about imitating them: hence proceeded the number of Latin orators, poets, and historians in the reigns of Clement VII. and Alexander VI. This passion for antiquity lasted for many years, to the utter exclusion of every other pursuit, till some began to find that those works which were imitated from nature were more like the writings of antiquity than even those written in express imitation. It was then modern language began to be cultivated with assiduity, and our poets and orators poured forth their wonders upon the world.—*Goldsmith's Bee.*

Anecdote of Sir Matthew Hale.—A nobleman called to explain a suit in which he was interested, and which was shortly to be tried, in order, as was alleged, to its being better understood when actually heard in court. The chief baron interrupted him, saying that he did not deal fairly to come to his chamber about such affairs; for he never received any information of causes but in open court, where both parties were to be heard alike. Nor would he suffer the noble duke to proceed. His grace retired dissatisfied, and complained of it to the king, as a rudeness not to be endured. But his majesty bid him content himself that he was no worse used; adding, that he verily believed he would have treated himself no better had he gone to solicit him in any of his own causes.—*Williams's Memoirs of Sir M. Hale.*

THE CULTIVATION OF COFFEE IN BRAZIL, &c.

[Coffee-Plantation in Brazil.—From an engraving in the 'Travels' of Rugendas.]

The botanical description of coffee, the history of its growth and introduction into Europe as an article of diet, and the general method of cultivating the plant, have been already treated of in an early number of this work.* We now propose to give a few notices of its cultivation in Brazil, and generally throughout South America—a subject of considerable importance—for whilst at present Brazil exports more coffee than any other place in the world, the extensive territories of Mexico, and of the other numerous independent states of that vast continent, will doubtless, before long, swell its product to an incalculable amount.

Although the coffee-plant is indigenous in Brazil (Southey specifies its discovery in the province of Bahia), it was not until the breaking out of the revolution in St. Domingo about fifty years ago, and the consequent rise of prices in Europe which that circumstance occasioned, that any attention was paid to its culture. Some of the planters, driven away by the proscription, which included all the white persons then resident in the country, emigrated to Brazil; one among these, a gentleman of the name of Lesesne, settled in the neighbourhood of Rio de Janeiro, and, at once introducing the best methods, was successful in producing berries of superior flavour. This naturally led to a demand for them at profitable prices; numerous competitors entered the field; and at this day the province of Rio Janeiro is distinguished above every other, alike for the quantity and excellence of the coffee it produces. The growth of this trade is truly remarkable. As we have seen, fifty years ago coffee was neither grown nor exported from any part of South America, yet Brazil about four years ago was exporting at the rate of seventy-two millions of pounds annually (the entire amount of produce is now estimated at one hundred and thirty-four millions), and in the whole, the continent exports not less probably than a hundred millions. It may be useful to compare the amount of this product with the product from the other countries from which the coffee used in Europe is chiefly received. From Cuba about sixty-four millions are exported; from Hayti, forty millions; Java, thirty-two millions; British West Indies, twenty-five millions; French West Indies, four millions, &c.; and from Mocha, one million: the smallness of this last return, we may observe by the way, shows how little of the coffee sold under this name can be genuine. The Brazilian coffee is shipped for all parts of Europe, but chiefly to Antwerp, Hamburg, and Trieste, and also to the United States, which alone receive one-third of the whole. In explanation of the allusion we have before made to the probable future product from Mexico, &c., we may observe, that it is only of very late years that much attention has been paid to the subject; already, however, the number of plantations is considerable, and steadily increases. The soil of Mexico is admirably adapted for the growth of coffee, and the capital required to commence a coffee-plantation is comparatively small. This circumstance it is which gives the coffee cultivator an advantage over the sugar-grower in all those (commercially speaking) new states. A plantation containing two hundred thousand coffee plants does not permanently require more than twenty men; that is to say, ten to weed and ten to water. In addition to these, however, fifty or sixty men are required about three months in the year to collect the crop, and clear and prune the trees. The result is, that Mexico, which in the early part of the present century exported no coffee, in 1830 exported it to the value of twenty thousand dollars.

With regard to the modes of cultivation in South America, "I observed," says Humboldt, speaking of the province of Caraccas in the state of Venezuela, "that in the coffee-plantations the nurseries are formed not so much by collecting together those young plants which accidentally rise under the trees that have yielded a crop, as by exposing the seeds of coffee to germination during five days in heaps between plantain-leaves. These seeds are taken out of the pulp, but yet retaining a part of it adhering to them. When this seed has germinated, it is

* Vol. i., No. 6.

sown, and produces plants that can bear the ardour of the sun better than those that spring up in the shade of the coffee-plantations."* In Mexico, and perhaps in other parts, where the heat is very great, the young plants are protected from the sun for two entire years; for which purpose, a large piece of ground, called the Semillero, is covered in, and thickly planted with young shoots; the third year they are transplanted into the open field, and in the fourth attain their full vigour. The coffee-trees are generally planted at the rate of one in about every two square yards. The trees flower the second year, and, generally speaking, produce abundantly the third year. In Brazil the berries are gathered twice in the year, namely, in the months of February and August; the best and the greatest quantities are sent to market between July and December. The berries are first of a dark green, which becomes red before pulling, and at the same time abound with a whitish milky-looking pulp between the cuticle and the seed; the foliage is dark and shining, and the bushes about nine or ten feet high. As the crop is gathered (the process illustrated in the engraving at the head of this article), the berries are spread out to dry till the pulp hardens; they are then thrown into a mill, where the husk is separated from the seeds; and, lastly, the seeds, now ready for exportation, are packed in long baskets, each containing five arrobas, or one hundred and sixty pounds. These baskets are purchased from the planters by an intermediate class of traders, who convey them in considerable numbers by droves of mules to Rio, or the other nearest port, and there sell them to the merchants. There is a circumstance connected with this transaction, which shows the honesty of the Brazilians in too honourable a light to be passed without mention. We have said that these baskets contain, or ought to contain, a certain specific quantity, and so satisfied are the parties concerned that this is always the case, that neither the merchant in purchasing, nor the custom-house officers in imposing the export duty, re-weigh them. The amount of produce from the coffee-plants varies very greatly: in Brazil the average is about from one pound and a half to two pounds, and this is superior to the mean produce of the West Indies; but in Mexico the average crops on good lands amount to nearly two pounds and a half. In individual cases, the produce is enormously increased: trees are often found bearing from sixteen to twenty pounds of coffee; and in one instance, mentioned by Mr. Ward, in his work on Mexico, the tree bore twenty-eight pounds. But rains at the time of flowering, want of water for artificial irrigation, and a parasitic plant (a new species of loranthus), which clings to the branches, are very injurious to coffee-trees, and tend much to lessen their produce. We may conclude by observing that Humboldt expresses his surprise that no attempt has been made to extract a spirituous liquor from the berries, considering the large proportion of organic matter they contain. He says berries merely heaped together produce a vinous fermentation, and emit a pleasant alcoholic smell.

* 'Personal Narrative,' translated by Helen Williams, vol. iv., p 68.

ASPHALTUM, OR BITUMEN.—No. I.

THE ASPHALTUM LAKES OF PALESTINE AND TRINIDAD.

THERE are several inflammable substances which, under the various names of asphaltum, bitumen, naphtha, maltha, petroleum, tar, pitch, &c., bear some degree of resemblance to each other, but the distinguishing features of which are not well understood by general readers. It will be desirable to explain in what they differ, before entering on the object of the present paper. *Tar* is a thick, black, unctuous substance, chiefly obtained from the pine and similar trees, by burning them in a close smothering heat. This process is performed to a great extent in the woody countries of northern Europe, in the manner described in 'Penny Magazine,' No. 247. *Pitch* is a residue which is obtained by boiling tar to dryness, and is therefore, like tar, of vegetable origin. *Bitumen* is a general name for several inflammable bodies, all of mineral origin; among which is *Compact Bitumen*, or *Asphaltum*, a black, solid, brittle substance, found in Palestine, Trinidad, and other places. *Elastic Bitumen*, or *Mineral Caoutchouc*, is found in Derbyshire; it possesses a certain degree of elasticity, and will erase the marks of a crayon or black-lead pencil, from which circumstance it has obtained the latter of its two names. *Petroleum* is a thick, viscid, dark-coloured, and strongly odorous substance, somewhat resembling tar; it sometimes oozes from rocks in the neighbourhood of beds of coal; and is also found in wells—a striking instance of which is the petroleum well at Zante ('Pen. Mag.,' No. 20). *Maltha*, or *Sea-Wax*, is a solid whitish substance, not much unlike tallow, found on the surface of Lake Baikal in Siberia, and in some other places. Lastly, *Naphtha* is a fine, white, thin, fragrant, colourless oil, which issues out of the clayey soils of Persia and Medea. Now all these substances possess a great degree of inflammability, and are thus frequently confounded one with another; but the property which we are about to consider, and which belongs only to part of the group, is that of hardening into a very compact and durable substance, when treated in a particular manner. The compact bitumen, or asphaltum, is the principal one possessing this character; but in late years the term *Asphaltum*, or *Asphalte* (the latter of which appears to be the French name), has been frequently applied, not only to the inflammable substance itself, but to the rocky masses in which it is often found. These explanations will fitly preface a brief inquiry into the manner in which asphalte is found combined with other substances on the surface of the earth, and of the mode of usefully employing it in the arts.

Of all the asphaltic regions known, none has acquired such prominent importance as that which is situated in Palestine, and known by the various names of the East Sea, the Salt Sea, the Sea of the Plain, Lake Asphaltites, Dead Sea, &c. This is supposed to be the site of the awful calamity mentioned in the 17th chapter of Genesis:—"Then the Lord rained upon Sodom and Gomorrah brimstone and fire, from the Lord out of heaven: and he overthrew those cities, and all the plain, and all the inhabitants of the cities, and that which grew upon the ground." It is natural that an intense and absorbing degree of interest should be excited by this passage in the sacred writings; and consequently travellers of all ages and nations have been desirous of visiting this spot and making observations on its present appearance. It has happened, however, that the situation of this sea in a country which has long been Mohammedan, and the hostility of rival pashas, have prevented the curiosity of many travellers from being gratified.

The chief features of the lake, as at present existing, are as follows:—It is situated in the southern part of Palestine, and is of an oblong form, being, according to Josephus, seventy-two miles long by eighteen broad, although some modern writers assign for it much smaller dimensions. The water is intensely salt, and the soil around, as well as the air hovering above, is strongly impregnated with saline particles; from these circumstances most animals shun the spot, and thus give it an inexpressively dreary appearance, which, indeed, has acquired for it the name of the "Dead Sea." More modern travellers, however, differ from these statements: the Rev. J. D. Paxon says, "Instead of that dark, gloomy, and turbid spread of water that from my childhood I had imagined, it struck me as a very pleasant lake. It reminded me of the beautiful lake of Nice." But the feature for which we here notice the lake is the quantity of *Asphaltum* floating on the surface. Moses, in the 14th chapter of Genesis, had said that the vale of

Siddim was full of *slime-pits;* and it has been supposed that the asphaltum arises from those slime-pits, now submerged beneath the waters of the lake. The asphaltum, as it floats to the surface, is driven by the winds to the western and southern banks, where it is collected by the natives, and used as a kind of pitch, as a medicine, and for embalming. But the inflammable solid which seems to constitute compact bitumen or asphaltum is found on the shores of the sea and in the neighbouring hills: it is quite black, takes a fine polish, and is occasionally used for ornamental purposes. These, as far as we are aware, are the only uses to which the asphaltum of Palestine is applied.

The bituminous matter appears from the above details to be in the twofold form of an adhesive pitch and a compact solid. But it is more frequently found combined with rocky substances into a hard coarse mineral. The most remarkable accumulation of this kind is in the island of Trinidad, of which a minute account has been given by Dr. Nugent, and of which we must here present the chief features.

Trinidad is a long narrow island near the coast of South America, and not far from the Gulf of Paria. On a headland about eighty feet above the level of the sea is a spot called the *Pitch Lake*, from the nature of the material composing it. On approaching the spot, a strong sulphureous and pitchy odour is perceptible; and the eye presently descries a dull plain, somewhat like an expanse of still water, frequently interrupted by clumps of dwarf trees or islets of rushes and shrubs. This apparent lake, however, is soon found to be nothing but a plain of mineral pitch with frequent crevices and chasms filled with water. The surface has an ashy hue, and the hardness or firmness seems to depend on the season of the year. When Dr. Nugent visited it (in the month of October), the surface was not slippery or polished; the substance was not adhesive to the foot; the foot made a slight impression; no tremulous motion was felt; and the hardness was such as to bear any weight to which he could subject it. But in the hot season the surface appears to be much more yielding, and approaching to the fluid state; for pieces of wood and branches of trees become imbedded in it. The surface is everywhere intersected by rents and chasms filled with water; the chasms varying in depth from a few inches to several yards; and it is remarkable that the water contained in them is perfectly free from bituminous taste or odour, and is used by the inhabitants of the neighbourhood for washing, cooking, bathing, &c. These crevices are frequently altering their form and course; for in the warm season, the two margins of a crevice have a tendency to coalesce and close the opening.

The extent of this mass of matter is supposed to be about three miles in circumference, being bounded on the north and west by the sea, on the south by a rocky eminence of porcelain jasper, and on the east by the usual soil of the country. Its depth could not be ascertained by Dr. Nugent; for no substratum could be discovered; indeed the mineral itself seems to form the substratum of the neighbouring soil, so that the extent is much more than meets the eye. Some parts of the bitumen are slightly covered with earth, and here are found long grass and shrubs, cassava, plantains, and pine-apples, as well as birds of exquisite plumage.

The appearance of this substance differs considerably in different spots. In some parts it is black, with a splintery shell-like fracture; of considerable specific gravity; having little or no lustre; bearing some resemblance to coal; and capable of bearing a severe blow with a hammer. In other parts it is so much softer that it can be cut with a spade, and then exhibits a vesicular and oily appearance in the interior: this is the degree of consistency of the greater part of the lake. Lastly, there are some spots where the bitumen is so fluid that it may be laded up. The odour in all these cases is that of combined sulphur and pitch; and a piece of the bitumen, when held in the flame of a candle, melts like sealing-wax, and burns with a light flame. Mr. Hatchett, from a careful analysis of the various kinds of bitumen procured from the lake, was of opinion that the greater part of it is not pure bitumen, but is a kind of porous argillaceous stone, impregnated with the inflammable matter, and that the liquid portion is a kind of petroleum, contained in fissures between the more solid parts.

It is not to be expected that such a phenomenon would escape the inquiries of geologists, or be left without an hypothesis to explain its formation. Some have supposed that the bitumen arises from the action of subterranean fires on beds of coal. Others have thought that the vast mass of vegetable and earthy matter brought down by the river Orinoco, and deposited near the island, has been gradually acted on by volcanic fires,—upheaved,—and converted into a bituminous state. But the means are not yet at hand for coming to a correct decision on this point; for the lake does not seem to occupy the mouth of an exhausted crater, nor is the hill itself, on which the lake stands, of volcanic origin. Yet a continual progress or motion seems to exist in the middle of the lake; and an immense quantity of pitch has, at some past period, flowed over the neighbouring country.

The softening of the bitumen by the action of the summer heat seems to show that if the substance is not wholly pitchy, a large portion of it must be so. It is said that if a square be cut out with a spade, the hole speedily closes in, and is no longer visible. When the Spaniards had possession of the island, they wished to apply the bitumen to some economical uses; but having erected their cauldrons on the lake itself,—trusting to its firmness,—they found that during one night the cauldrons had sunk into the lake and completely disappeared. Sir J. E. Alexander states that some time ago a ship of war landed casks to fill with the pitch, for the purpose of transporting it to England; the casks were rolled on the lake, and the hands commenced filling, but a piratical craft appearing in the offing, the frigate, with all hands, went in chase; on returning to the lake, all the casks had sunk and disappeared.

One of the most remarkable circumstances connected with this lake is, that the water in the fissures seems to have a connection with the sea; for marked poles have been thrust into them; and some time afterwards have been found on the neighbouring coast of the sea. Small alligators, which must evidently have come from the sea, have sometimes been found in the watery fissures.

With regard to the employment of this substance, Dr. Nugent, who wrote some years ago, was very sanguine. He states that it is universally used at Trinidad wherever pitch was required; a little oil, tallow, or common tar being used to give it a sufficient degree of fluidity. He adds that "this vast collection of bitumen might, in all probability, afford an inexhaustible supply of an essential article of naval stores, and being situate on the margin of the sea, could be wrought and shipped with little inconvenience or expense." It appears however that this expectation has not been realised; for Admiral Cochrane having sent two shiploads of the bitumen to England for trial, it was found, after numerous experiments, that so large a quantity of oil was requisite, in order to make the bitumen fit for use, that the expense of oil alone exceeded the price of pitch in England.

There is another mode of employing it, however, to which we may briefly allude, viz., the forming of a road-cement. Nearly forty years ago, Mr. Tobin suggested that this substance might be employed for pavement; but the subject appears to have slumbered after that time; for we meet with no renewal of the idea till very recently. Mr. Montgomery Martin, in his valuable 'History of the British Colonies,' says: "I am indebted to Major-General Sir Lewis Grant, late governor of

Trinidad, for the following curious fact:—The pitch of the lake has been adopted for the improvement of the roads, particularly in the fertile district of Naparima, where it was brought for the purpose from La Brea. In the wet season, the roads at Naparima are almost impassable at those parts where there has been no application of the pitch; but where the pitch has been applied, which is the case for several miles in North Naparima, there is a hard surface formed, which makes transport comparatively easy, both from the support afforded and from the little friction of the hardened pitch."

This brings us to the employment of bituminous earth as a cement, a subject which has recently occupied much attention, but the consideration of which we must defer to another number. There are other pitch lakes, or large accumulations of bituminous matter, in different parts of the earth, the nature of which nearly resembles what has already been described.

THE SISTERS OF CHARITY.

The nursing or tending the sick is essentially the province of women; men have neither the gentleness of demeanour, the intensity of sympathy, the perseverance, nor the physical adroitness necessary for the task. We imagine there are few of our readers who have not, some time or another, experienced the peculiar solace derived from female aid in moments of bodily suffering, or during the tedium of protracted indisposition. The occupation, although necessitating some menial services, is an important and honourable one, and every medical man will testify how much depends upon the nurse in the treatment of severe diseases; for while, on the one side, she may be, as it were, his right hand, carrying out and fulfilling the suggestions of his skill and experience, so, on the other, she may become the very marplot of his views, and substitute for his directions the plans dictated by a conceited ignorance. It is not the desire to do well even that suffices, for while the philanthropist is gladdened by observing the sacrifices friends, neighbours, or even strangers often make in their attentions upon the sick, he too often has to lament that, by the wrong direction which has been imparted to these, the good proportioned to their extent has not always followed, and that sometimes positive evil has resulted. Knowledge here, as in all other cases, is required for the means employed to be turned to the best ends, and for the want of this knowledge the evils inflicted by ignorant nurses in this country are great, to an extent that can only be known by those whose occupations call upon them especially to observe them. It is not our intention here to discuss the remedy for this state of things, but we may observe that the magnificent hospitals in which this country is so rich might easily be converted into schools for the educating and training an adequate number of nurses for the wants of the public. Before this can come to pass, however, the emoluments paid to this useful class of servants in those institutions should be increased, in order to induce persons of a higher grade to enter their service, which few now do who can obtain any other means of subsistence.

Our object in this article is to bring before the reader a short account of the religious societies of women which are found in France and some other parts of the Continent devoting themselves to the care of the sick and poor. It is quite true that the ideas of the duties of religion and of society prevalent in this country disapprove of and discountenance all descriptions of monastic institutions, as encouraging an evasion of the obligations of life, yet we feel certain that a very different feeling must prevail in regard to an association instituted expressly for the active performance of some of the most important offices human beings can render to each other.

Although various other societies of women, under the name of Hôpitalières, had done duty in the hospitals long prior, the Sisters of Charity, properly so called, were organised by the benevolent Vincent St. Paul, in 1634, and soon spread themselves, as did other societies formed in imitation of them, over the whole of France and various parts of Europe. They still continue, and in full activity. "They have survived," says Foderé, "all revolutions, while the Brothers of the same name have long ceased to exist, the spirit of worldliness and of self-interest having triumphed over these last."

The costume is simple, consisting of a black serge gown and a white head-dress. Vows were never made for perpetuity, and a decree of 1809 determined that a novice could not contract an engagement before the age of sixteen, and then only for one year: at the age of twenty-one they may take the vows for five years. The engagement must be made in presence of the civil and ecclesiastical authorities. The Sisters retain full power of disposing by will of all property they possess, and as a society the Order is not entitled to hold any. They form a most numerous body, consisting of several thousands; and above three hundred houses of refuge, hospitals, &c. in different parts of France are supplied by their means with attendants. When they become attached to an hospital, they are submitted to two jurisdictions, that of the bishop in whose diocese it is situated, and that of the administrator of the hospital, to whose regulations they must strictly conform. A general hospital council regulates the number to be employed. They are fed and lodged by the institution, and receive a trifling sum (about ten francs a month) for clothing. An ordonnance of 1821 decrees that those sisters who, from age or infirmity, become incapable of further service, are to be still maintained by the institution, under the name of Reposantes; but, if they prefer it, they may retire upon a small pension, proportionate to the length of their services and the funds of the hospital.

Originally, the congregation of the Sisters of Charity consisted of females of such a station of life that, while they comforted and consoled the poor, they could not descend to the performance of the more menial offices. Afterwards women of an inferior rank were admitted for these purposes; and were soon after formed, under the jurisdiction of Vincent St. Paul, into a distinct society, known as "Servantes des Pauvres de Charité."

We have already said that there are several distinct congregations known under different names (as the Sisters of Mercy, of St. Laurence, of St. Martha, &c.), but they are all alike in the objects they have in view and the means of accomplishing them. These objects are of the highest nature, being the full carrying out of some of the principal precepts commanded by the Christian religion. Wherever want, sickness, or misery is present, there will be found these excellent women, assuaging at once mental anguish and physical distress. They are not confined to the hospitals, but are found in every parish; and after distributing succour to such as are able to come for it, they traverse the streets, lanes, and courts, in order to visit those who are not. Offices the most revolting are performed by them with cheerfulness, and their arrival is always looked for as conferring at least temporary happiness upon the miserable invalids. The foundling hospitals and prisons are continually attended by them: but perhaps it is among the prisoners at the hulks that their most trying duties are encountered, where their kind attentions and entreaties are too often replied to but by horrid blasphemies and imprecations. They follow the armies, and thus render inestimable service to the wounded soldiers, services which are not confined to their own countrymen, for many an English family owes to the careful attention of a Sister of Charity the eventual restoration to its bosom of some one of its members. Many a delicate woman has fallen a victim to the fatigues and privations inseparable from a military campaign. In the time of plagues and epidemic visitations, the con-

duct of these women has frequently been heroic, great numbers falling sacrifices to their charitable attentions. The merit of the Sisters of Charity is the greater, because in many instances they voluntarily resign all the pleasures and comforts of an elevated rank, to submit themselves to suffering and privation for the sake of their fellow-creatures. Their information on various subjects connected with botany and the elements of medicine is often considerable; so that, in case of need, they are frequently enabled to perform various of the inferior medical duties. In every parish they have a receptacle for medicines, whence they distribute them, with other necessaries, to the poor. For admission into the order, their families must have been spotless in reputation; while the daughter of a bankrupt, or any one who has been in service, is prohibited from entering.

Of course, actuated by such excellent motives in entering upon their duties, and presented with such numerous opportunities for their exercise, many of the Sisters have rendered themselves especially remarkable; but perhaps no one has done so more than Sister Martha, whose reputation has indeed become European. Her conduct during the various campaigns and at the plague of Barcelona are only to be exceeded by the nature of the recompense she chose, namely, the pardon of a soldier condemned to death by a military tribunal. This excellent woman died at Besançon, of the consequences of the plague which she herself had contracted at Barcelona.

Voltaire, speaking of the Sisters of Charity, says:—"Perhaps there is no grander sacrifice in the world than that made by a delicate sex—beauty, youth, and often high birth—in solacing in an hospital that assemblage of human misery whose very appearance is so humiliating to our pride and revolting to our delicacy." Dr. Johnston, in his 'History of the Public Charities of France,' expresses himself as follows:—

"Of these persons, none deserve notice more than the Sœurs de la Charité, who may be said to have quitted the world to devote themselves to the relief of the unfortunate persons who people these abodes of misery. Even in times when religion was almost a by-word in France, and when its ministers were abused and trodden down by a misguided populace, a certain share of respect was paid to these congregations of charity, who made it the business of their lives to comfort the sick and afflicted. Mingling zeal with gentleness, they have spent the best portions of their lives in the midst of much that is disgusting and revolting, and have rendered services to humanity which must merit eternal gratitude. They have also introduced into the establishments economy and regularity; and, in that respect, are as valuable to the administration as to the sick. Possessed of superior education, and, from their religious profession, placed above many of the worldly considerations which must affect nurses in general, the Sister of Charity, acting at once as a spiritual and corporeal comforter, watches over the sick bed, soothes the prisoner in his cell, and penetrates the worst abodes of misery to comfort the distressed and instruct the ignorant. Wherever they have the management, cleanliness and good order are conspicuous; while other establishments, in which they are not engaged, present a marked inferiority in these respects."

Effects of War.—The crowds of peasantry that made their way to the capital (Lisbon, in 1829) from the country, flying from their foes, accumulated as the enemy closed in upon the environs of the city: the distress of many was pitiable; they had left all behind them, and were literally without any support but the casual benevolence of a few, who had so many calls upon their humanity, that their means were speedily exhausted. Many of great respectability were reduced to the extremity of begging of our countrymen: it was melancholy to witness well dressed Portuguese watching the opportunity of whispering their tales of distress and petitions for aid in the ears of the English, hoping to escape the observation of the passers-by and their own country people. The man who could resist the appeal of interesting females, the withering look of agony and humiliation which marked their countenances, as they implored relief for some cherished object perishing with hunger and misery, must have been made of sterner stuff than usually forms the component parts of our nature. The calamities of the inhabitants of a country exposed to war are severe: friends and foes must alike be provided for, and all the means in their possession are relentlessly demanded, and carried off; any hesitation or refusal only subjects them to rougher treatment and exactions. Lisbon was full to overflowing with the unfortunate refugees; there was not house-room for the poor wretches, and many had to fight with the mongrel curs that swarmed the streets for their lairs on the quays, and wherever the smallest shelter could be obtained: the sight was truly distressing.—*Recollections of a Naval Life.*

Coffee-Shops in London.—Several coffee-shop keepers who gave evidence before the Committee on Imports showed that the establishment of coffee-shops had been the means of creating improved habits among large classes of the community. Twenty-five years ago the number of coffee-shops in London to which respectable artizans could resort did not amount to twenty, and there were none for the more humble of the labouring classes. The number of coffee-shops in London is now from 1600 to 1800, affording accommodation to persons of every class. Mr. Humphreys, a coffee-shop keeper, said, "About twenty-five years ago, there was scarcely a house in London where you could get any coffee under 6*d.* a cup, or 3*d.* a cup; there are now coffee-houses open at from 1*d.* up to 3*d.* There are many houses where the charge is 1*d.* where they serve from 700 to 800 persons in a day. There is Mr. Pamphilon, who charges 1½*d.* a cup, and he has from 1500 to 1600 persons a day." Some of these shops are open from four in the morning until eleven at night. At one coffee-shop forty-three London daily papers are taken, and an individual who pays 1½*d.* for a cup of coffee has the opportunity of reading any of them. In addition to these daily papers, seven country papers are taken, six foreign papers, twenty-four monthly magazines, four reviews, and eleven weekly periodicals. Another coffee-shop keeper stated that prior to the reduction of the newspaper duty he paid 400*l.* a year for newspapers and magazines, and for binding the yearly volumes. Mr. Humphreys remarked, that since he had been in business, a manifest improvement had taken place in the taste of literature amongst the classes who frequent his house. No intoxicating liquors are sold in the great majority of the coffee-shops, while in the accommodation which they afford, they are far superior to the public-houses. At Mr. Letchford's coffee-shop, in High Street, St. Giles, which is frequented daily by from 700 to 900 hard-working men, the charge for a cup of coffee in the different rooms is 1*d.*, 1½*d.*, and 3*d.* "A man comes in the morning at four o'clock, and has a cup of coffee and a thin slice of bread and butter, and for that he pays 1½*d.*; and then again, at eight, for his breakfast, he has a cup of coffee, a penny loaf, and a pennyworth of butter, which is 3*d.*; and at dinner-time, instead of going to a public-house at one o'clock, he comes in again, and has his coffee and his bread, and brings his own meat." Nine daily papers are taken at this house. The general practice of the trade, when coffee is sold for 1½*d.* a cup, is to charge 2*d.* for tea; and at Mr. Letchford's, the consumption of coffee is two-thirds, and of tea one-third. Within the last few years most of the keepers of coffee-shops have been compelled, by the general demand of the persons frequenting them, to sell cooked meat. At Mr. Humphrey's house about three cwts. of ham and cold meat are sold weekly. Temperance societies and friendly societies are getting into the habit of using coffee-shops for their periodical meetings. Mr. Humphreys, in the course of his evidence, said, "I have often asked myself the question where all the number of persons now frequenting my house could possibly have got their refreshment prior to its being opened. There were taverns in the neighbourhood, but no coffee-houses, nor anything that afforded any accommodation of the nature I now give them."—*Comp. to Alm. for* 1841

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